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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/662,691	09/15/2003	Teemu Sipila	KOLS.048PA	9770

7590 02/23/2006

Hollingsworth & Funk, LLC  
Suite 125  
8009 34th Avenue South  
Minneapolis, MN 55425

EXAMINER
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ABRAHAM, ESAW T

ART UNIT	PAPER NUMBER
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2133

DATE MAILED: 02/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/662,691

Applicant(s)

SIPILA, TEEMU

Examiner

Esaw T. Abraham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 09/15/03.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

1. Claims **1-18** are presented for examination.

### PRIORITY

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d) filed on 09/16/2002.

### INFORMATION DISCLOSURE STATEMENT

3. The references listed in the information disclosure statement submitted on 09/15/03 have been considered by the examiner (see attached PTO-1449).

### SPECIFICATION

4. The title of the invention is not descriptive. A **new title** is required that is clearly indicative of the invention to which the claims are directed.  
Appropriate correction is required.

### CLAIM OBJECTIONS

5. Claims **1-18** are objected to because of the following informalities:
  - a) The claims (1-18) are objected to because the lines are crowded too closely together, making reading and entry of amendments difficult. Substitute claims with lines one and one-half or double spaced on good quality paper are required. See 37 CFR 1.52(b).
  - b) Please change the phrase "which arrangement" to --- which the arrangement--  
- (see claim 1, line 2).
  - c) Please change the phrase "calculating the consecutive metrics" to ---  
calculating consecutive metrics--- (see claim 1, line 4).

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d) Please define the full word of a written word or phrase for the **abbreviations** "ACS" as specified in the specification (see page 2, paragraph [0005]).

e) Please change the phrase "An arrangement" to ---The arrangement--- (see line 1 of claims 2-9).

f) Please change the phrase "A method" to ---The method--- (see line 1 of claims 11-18).

g) Claim 7 recites, "the calculation is connectable back to" since "connectable back" only suggests or makes optional, the term "connectable back" fails to further limit the claim. The examiner suggests: ----the calculation is connected back to---  
Appropriate correction is required.

### **Claim Rejections - 35 USC § 112**

The following is a quotation of the second paragraph of 35 U. S. C 112

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims **1-4** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a) Claim 1 recited, "ACS units to be used" (Emphasis Added). The term "**to be used**" is indefinite.

b) Claim 2 recites "read/write" which is indefinite since it is not clear what is meant by "read/write". The examiner is assuming that the Applicant intended ---read or write operation---

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c) Claim 3 recites "read/write" which is indefinite since it is not clear what is meant by "read/write". The examiner is assuming that the Applicant intended ---read or write operation---

d) Claim 3 recites "from/to" which is indefinite since it is not clear what is meant by "from/to". The examiner is assuming that the Applicant intended ---from a state or to a state---

e) Claim 3 recites "from/to" which is indefinite since it is not clear what is meant by "from/to". The examiner is assuming that the Applicant intended ---Y is from the number of braches to a state---

e) Claim 4 recites "from/to" which is indefinite since it is not clear what is meant by "from/to". The examiner is assuming that the Applicant intended ---Y is from the number of braches to a state---

Appropriate correction is required.

### **Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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The factual inquiries set forth in *Graham v. John Deere CO.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims **1-3, 10-11 and 17-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosevar et al. (U.S. PN: 6,690,750).

**As per claims 1 and 10:**

Hosevar et al. teach or disclose a Viterbi decoder (110) (see FIG. 6) and a method of decoding plurality of trellis stages (see FIG. 5) simultaneously via a cascaded ACS (122) (see FIG. 7 and col. 6 lines 15-30). Further, Hosevar et al. teach that the cascaded ACS (122), in conjunction with the state metric memory (126), determines a set of accumulated state metrics (125), which also referred to as path metrics, for each stage in the trellis as the decoding process moves forward in time and furthermore the cascaded ACS (122) performs additions, subtractions, and comparisons, with a set of incoming branch metrics (134) and selects new state metrics from which path decision values (124) are determined (see col. 7, lines 19-43). Hosevar et al. **do not explicitly** teach that the outputs of the ACS units are directly connected to the inputs of the ACS units and used in the calculation of the next stage of the trellis. **However**, Hosevar et al. in figure 7 disclose four ACS units (150b-156b) connected or coupled directly to each other (for example, the output of ACS 150b is

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connected to the input of ACS 152b and the output of ACS 152b is connected to ACS 154b etc..) and this is accomplished by evaluating a metric at each state to determine which one of two incoming branches provides the smallest or preferably largest next state metric (125) depending on the particular algorithm implementation desired (see col. 7, lines 26-31) which is basically the system of Hosevar is performing the same method as the applicants' invention for calculating metrics of the trellis. **Therefore**, it would have been obvious to a person having an ordinary skill in the art at the time the invention was made to connect the outputs of the ACS units to the inputs of the ACS units directly as taught by Hosevar et al. to calculate for the next stages. **This modification** would have been obvious because a person having ordinary skill in the art would have been motivated in order to reduce memory access cycles, and thereby lowers power requirements and increases system throughput (see col. 6, lines 16-21).

**As per claims 2 and 11:**

Hosevar et al. teach all the subject matter claimed in claim 1 including Hosevar et al. in figure 6 disclose that the cascaded ACS (122) coupled to a SRAM memory (126) for storing the set of metrics which are continually being read out, update and written back thereto (see col. 7, lines 43-50).

**As per claim 3:**

Hosevar et al. teach all the subject matter claimed in claim 1 including Hosevar et al. teach that a set of branch metrics are added to the accumulated state metrics from the previous stage then, a branch is chosen from each ACS operation based on which

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branch will yield the lowest or preferably the highest accumulated state metric for the next stage (see col. 6, last paragraph).

**As per claims 17 and 18:**

Hosevar et al. in figure 7 disclose four ACS units (150b-156b) connected or coupled directly to each other (for example, the output of ACS 150b is connected to the input of ACS 152b and the output of ACS 152b is connected to ACS 154b etc..) and this is accomplished by evaluating a metric at each state to determine which one of two incoming branches provides the smallest or preferably largest next state metric (125) depending on the particular algorithm implementation desired (see col.7, lines 26-31)

5. Claims **4-9 and 12-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosevar et al. (U.S. PN: 6,690,750) in view of How (U.S. PN: 5,408,502).

**As per claims 4 and 12:**

Hosevar et al. teach all the subject matter claimed in claim 1 including Hosevar teaches that the ACS unit (122) forms a cascade and consists of four ACS blocks (150b through 156b) and each ACS block performs a plurality of radix-2 or butterfly ACS (which a butterfly ACS comprises pairs of ACS units) Add/Compare/Select operations over one stage of the trellis (see col.9, lines 19-36). Hosevar et al. **do not explicitly** teach that several ACS units arranged as pair ACS units or ACS banks. **However**, How in FIG. 10 teaches an ACS array, containing eight banks of four ACS pairs wherein Bank (250) (ACS 1), receives the branch metrics output from solid-state switches 210 (BMI), 212 (BMII), 214 (BMIII), and 216 (BMIV) as indicated and Banks 252 (ACS 2),

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254 (ACS 3), 256 (ACS 4), 260 (ACS 5), 262 (ACS 6), 264 (ACS 7), and 266 (ACS 8) contain identical ACS pairs, coupled to receive the branch metrics as indicated and further the three lower ACS pairs in each of banks (260, 262, 264 and 266) have their inputs coupled identically with the inputs of the top ACS pair in the respective bank.

**Therefore**, it would have been obvious to a person having an ordinary skill in the art at the time the invention was made to implement the teachings of Hosevar et al. to arrange or to form ACS units as ACS banks as taught by How. **This modification** would have been obvious because a person having ordinary skill in the art would have been motivated to in order to reduce bit errors by substantial factor (see col. 13, lines 2-4).

**As per claims 5 and 13:**

Hosevar et al. in view of How teach all the subject matter claimed in claims 1 and 4 including Hosevar et al. teach that the cascaded ACS (122), in conjunction with the state metric memory (126), determines a set of accumulated state metrics (125), which also referred to as path metrics, for each stage in the trellis as the decoding process moves forward in time and furthermore the cascaded ACS (122) performs additions, subtractions, and comparisons, with a set of incoming branch metrics (134) and selects new state metrics from which path decision values (124) are determined (see col. 7, lines 19-43).

**As per claims 6 and 14:**

Hosevar et al. in view of How teach all the subject matter claimed in claims 1 and 4 including How in figure 10 teaches an ACS array, containing eight banks of four ACS pairs wherein Bank (250) (ACS 1), receives the branch metrics output from solid-state

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switches as indicated and Banks 252 (ACS 2), 254 (ACS 3), 256 (ACS 4), 260 (ACS 5), 262 (ACS 6), 264 (ACS 7), and 266 (ACS 8) contain identical ACS pairs, coupled to receive the branch metrics as indicated and further the three lower ACS pairs in each of banks (260, 262, 264 and 266) have their inputs coupled identically with the inputs of the top ACS pair (in parallel) in the respective bank.

**As per claims 7 and 15:**

Hosevar et al. in view of How teach all the subject matter claimed in claims 1 and 4 including Hosevar et al. in figure 7 disclose four ACS units (150b-156b) connected or coupled directly to each other (for example, the output of ACS 150b is connected to the input of ACS 152b and the output of ACS 152b is connected to ACS 154b etc..) and this is accomplished by evaluating a metric at each state to determine which one of two incoming branches provides the smallest or preferably largest next state metric (125) depending on the particular algorithm implementation desired (see col.7, lines 26-31). Further, Hosevar et al. in figure 6 teaches that the input to cascaded ACS unit (122) fed back from the output of the cascaded ACS unit via the state metric memory (126).

**As per claims 8, 9, and 16:**

Hosevar et al. in view of How teach all the subject matter claimed in claims 1 and 4 including Hosevar et al. teach a VLSI architecture for a Viterbi decoder for wireless or other type applications which may operate within a programmable DSP system (processor)(see col. 4, lines 37-44). Further, Hosevar et al. teach all the subject matter claimed in claim 1 including Hosevar et al. in figure 6 disclose that the cascaded ACS

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(122) coupled to a SRAM memory (126) for storing the set of metrics which are continually being read out, update and written back thereto (see col. 7, lines 43-50).

### **Conclusion**

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US PN: 6,865,710 Bickerstaff et al.

US PN: 5,027,347 Rossman, Mark W.

US PN: 6,333,954 Hansquine, David

US PN: 5,327,440 Fredrickson et al.

US PN: 6,115,436 Ramesh et al.

US PN: 6,259,749 Andoh, Takeshi

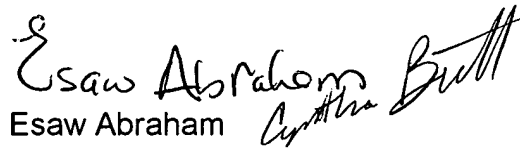
US PN: 6,680,986 Hemmati, Farhad

9. Any inquiry concerning this communication or earlier communication from the examiner should be directed to Esaw Abraham whose telephone number is (571) 272-3812. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are successful, the examiner's supervisor, Albert DeCady can be reached on (571) 272-3819. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and (571) 273-8300 for after final communications.

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Information regarding the status of an Application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or PUBLIC PAIR. Status information for unpublished applications is available through Private Pair only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Esaw Abraham

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